

REMARKS

Claim 20 is amended to call for a pin block that includes a stand-off that locates the pin block a sufficient distance from the circuit board to enable a solder fillet to form, as originally recited in claim 24, now cancelled. Claim 20 is also amended to more particularly point out that the conductive bonding agent is a solder paste, as described throughout the specification including at page 13, lines 17-18, in view of claim 21, now cancelled. Claims 22 and 23 are amended to be consistent with the amended antecedent in claim 20.

Applicants request that the finality of the Office Action be withdrawn. The Action applies new grounds and a new reference, Vicich et al., in rejecting the claims. Applicants only seek a fair opportunity to address these new grounds. Moreover, nothing in Applicants' prior amendment necessitated the new grounds.

In the alternative, in the event the Action is not withdrawn from Final, it is requested that the amendments herein be entered nevertheless, if only in order to rewrite claim 24 in independent form for purposes of appeal.

Claim Rejection based upon McCoy et al. and Vicich et al.

Claims 20-23 and 25 were rejected under 35 U.S.C. § 103 as unpatentable over United States Patent No. 4,884,335, issued to McCoy et al. in 1989, in view of United States Patent No. 5,960,537, issued to Vicich et al. in 1999.

Claim 20, amended herein, recites two significant features of Applicants' invention. First, Applicants' method includes placing solder paste on the conductive pad spaced apart from the through-hole. This prevents the paste from smearing when the terminal is inserted into the through-hole, and retains the solder paste as dispensed to assure that, during re-flow, the solder fillet forms between the first pad and the terminal. The claim also recites that the pin block that carries the terminal includes a stand-off to space the pin block apart from the board. As a result, the pin block does not interfere with the solder during re-flow to form the desired fillet between the terminal and the pad.

McCoy et al. provides a preformed solder strip 33A in Fig. 4A or 33B in Fig. 4B that has holes 104 and 110 to allow insertion of the pin contacts 31, see col. 8, beginning at line 29, and particularly lines 40-43. Because McCoy et al. contemplates a strip that is a self-sustaining pre-form, it does not smear on the pin contacts 31 when inserted. Also, it is significant that McCoy et al. provides contact between the pin and the solder strip, col. 9, lines 31-36. Placement of the solder about the pin contacts and over the through holes assist in drawing the solder links 100 apart during re-flow. While McCoy et al. does provide stand off protrusions 39 in Fig. 3, it does not show the flow of solder applied to the board apart from the hole. In contrast, Applicants have found that, by providing the spacing and applying the solder paste on the board apart from the through-hole, the solder re-flows to form the desired fillet between the terminal and the pad. McCoy et al. does not show this feature and so does not suggest Applicants' invention.

Vicich et al. is cited to show applying solder paste 32 spaced apart from through-

hole 36. Referring to Fig. 3, the pin 21 is inserted through the connector body 24 and held by a fastener 10. The connector body with the pin is then assembled with the board 30 so that the solder paste makes contact with fastener 10, so that, upon re-flow, the solder bonds the component to the board, col. 4, lines 41-46. Thus, Vicich et al. seeks intimate physical contact to distribute the solder paste and form the desired bond. Since Applicants' invention provides spacing to prevent direct bonding to the component and allow flow to the through-hole without physical interference by the component, Vicich et al. does not point to Applicants' invention.

When fairly read, the references do not lead the practitioner to Applicants' invention. It is clear that the self-sustaining solder in contact with the pin at the through-hole are essential elements in McCoy et al. Nothing in McCoy et al. suggests to apply paste on the conductive pad and apart from the hole. On the other hand, Vicich et al. seeks intimate contact with the component to form the solder joint apart from the hole, and so does not lead the practitioner to provide spacing with a stand off. It is only after disclosure of Applicants' invention that it is seen that solder paste may be applied apart from the through-hole to avoid contact with the terminal during insertion, and a spacing provided by a stand-off to allow the solder to be drawn into the through-hole during re-flow. The references themselves do not point to the combination of the features to achieve this result.

Claim 20 is directed to Applicants' method that includes placing solder paste on the conductive pad spaced apart from the through-hole. The claim also calls for a pin

block with a stand-off that is placed against the first surface of the circuit board substrate to provide a sufficient distance to enable a solder fillet to form between the terminal and the pad. In McCoy et al., contact with the holes of the solder strip helps to retain the strip in position and encourages the desired flow of the strip into discrete pools. Vicich et al. applies solder paste apart from the hole to form a direct bond with the component. The rejection ignores essential features of the references – the strip in McCoy et al. and the direct bond in Vicich et al. However, the practitioner is not lead to eliminate the contact between the solder and the pins in McCoy et al. or eliminate the bond to the component in Vicich et al. Thus, when fairly read, the references do not lead the practitioner on an obvious path to Applicants' method in claim 20.

Claims 21-25 are dependent upon claim 20 and recite additional features preferred in the practice of Applicants' method. Further, attention is directed to claim 23. The rejection states that it would have been obvious to use a stencil in McCoy et al. However, McCoy et al. uses a pre-formed strip and so would not need or suggest a stencil. Moreover, Vicich et al. is not concerned with protecting solder paste from the hole and so would not suggest using a stencil to do so.

Accordingly, it is respectfully requested that the rejection of claims 20, 22, 23 and 25 based upon McCoy et al. and Vicich et al. be reconsidered and withdrawn, and that the claims be allowed.

Conclusion

It is believed, in view of the amendments and remarks herein, that all grounds of rejection of the claims have been addressed and overcome, and that all claims are in condition for allowance. If it would further prosecution of the application, the Examiner is urged to contact the undersigned at the phone number provided.

The Commissioner is hereby authorized to charge any fees associated with this communication to Deposit Account No. 50-0831.

Respectfully submitted,



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